



A new nano-biophotonics toolbox

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"Novel Optical Materials and Applications"*

*NOMA
2013*



ABSTRACTS

In alphabetical order of speaker's names

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A new nano-biophotonics toolbox

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The science fiction inspired shrinking of macro-scale robotic manipulation and handling down to the micro- and nano-scale regime open new doors for exploiting the forces and torques of light for micro- and nanobiologic probing, actuation and control. A generic approach for optimizing light-matter interaction on these scales involves the combination of optimal light-sculpting with the use of optimized shapes in micro-robotics structures. Micro-fabrication processes such as two-photon photo-polymerization offer three-dimensional resolutions for creating custom-designed monolithic microstructures that can be equipped with optical trapping handles for convenient mechanical control using only optical forces. These microstructures can be effectively handled with simultaneous top- and side-view on our BioPhotonics Workstation to undertake six-degree-of-freedom optical actuation of two-photon polymerised microstructures equipped with features easily entering the submicron-regime. Aided by European collaborators who fabricated test structures with built-in waveguides for us, we were able to put the idea of optically steerable freestanding waveguides – coined: wave-guided optical waveguides - to the test using our BioPhotonics Workstation. We also propose using these techniques for generating two-photon real-time spatially sculpted light for the strongly emerging areas of neurophotonics and optogenetics.

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